MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Permitting and Compliance Division
Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

Permit Fact Sheet
Montana Ground Water Pollution Control System (MGWPCS)

Permittee:	Georgetown Development LLC
Permit No.:	MTX000201
Receiving Water:	Class I Ground Water
Facility Information	
Name:	Lakeside at Georgetown
Mailing Address:	P.O Box 7846 Missoula, MT 59807
Contact:	Jay Schuette
Phone:	406-939-8337
Fee Information	
Number of Outfalls:	1
Outfall - Type:	001 Drainfield

I. Permit Status

This is a new permit for a proposed wastewater treatment system that is part of 22 single family homes located adjacent to Georgetown Lake, MT. The Department received the initial permit application and supporting documents on June 11, 2007. The application was determined to be deficient on July 9, July 18, and August 20, 2007. The Department received responses to all the deficiency letters. Supplemental application materials were received and the permit application was deemed complete on November 5, 2007

II. Facility Information

A. Facility Description

Lakeside at Georgetown (LG) requested a deviation in the volume of wastewater to be discharged from the Public Water Supply and Subdivisions Section of the Permitting and Compliance Division. The Department granted the request, allowing LG a design flow of 250 gpd per dwelling unit (DEQ 2008). This deviation will allow 5,500 gallons of wastewater to be discharged per day from 22 single family dwelling units. Each dwelling unit will have its own septic tank. Effluent from each septic tank will be conveyed via sewer main to a 12,000 gallon recirculation tank. At this point wastewater will be treated in an Advantex Textile Based Packed Bed Sand Filter (PBF). From the Advantex system, effluent is directed to a 4,000 gallon dose tank and ultimately discharged to a single zone drainfield.

The proposed wastewater treatment facility will discharge via a single zoned drainfield. The single zone drainfield will be deemed outfalls 001. The drainfields are located on the hydraulically upgradient side of the LG property. Outfall 001 is situated in T05N, R14W, in the southeast ¼ of Section 24, or N 46º10' 16" latitude and W 113º 17' 15" longitude.

LG has proposed to locate outfall 001 adjacent to a abandoned drainfield used by the previous un-permitted facility. The proposed drainfield is also up gradient of an additional abandoned drain field which discharged high strength untreated wastewater (wastewater generated by recreational vehicles [RV]). The proposed drainfield is also down gradient of multiple single family drainfields.

B. Effluent Characteristics

The wastewater treatment system is a new system therefore no effluent samples have been collected or analyzed. However, the applicant has submitted effluent data from similar PBF systems. Effluent characteristics of similar PBF systems are listed in table 1.

Table 1 Effluent Characteristics

Parameter	Units	Maximum
Total Suspended Solids (TSS)	mg/L	<30
Biological Oxygen Demand (BOD)	mg/L	<30
Total Coliform	mpn/100 ml	1000
Total Ammonia, as N	mg/l	<48
Total Kjeldahl Nitrogen, as N	mg/L	<50
Nitrate	mg/L	<24
Total Phosphorous, as P	mg/L	10.6

III. Proposed Technology Based Effluent Limits

A level II system must provide at least a 60 % removal of total nitrogen in the raw wastewater or produce effluent with a total nitrogen concentration of 24 mg/L or less [ARM 17.30.702 (11)]. The proposed system meets the definition of level II treatment (Regensburger 2004). The

applicant did not request for permit limits to be set based on a 60 % removal rate or submit information regarding a sampling and analysis plan for determining a 60 percent removal or provide information as to influent and effluent sampling as part of compliance monitoring or submit information delineating the methods and locations of influent and effluent sampling. Moreover the applicant submitted information indicating that individual septic tanks were to be employed at each dwelling unit. As a result, a 60 percent removal rate would have to be calculated for the entire treatment system. This would be extremely difficult to quantify from single septic tanks. Therefore, the Department will use 24 mg/l as a technology based effluent limit because of the inability to get reliable estimates of 60 percent removal of total nitrogen from a wastewater treatment system incorporating individual septic tanks at each residence. Because an additional 7% of nitrogen removal is assumed to occur within the drainfield a proposed limit of 26 mg/L will be used. The technology-based permit limit for total nitrogen will be set at 26 mg/L (see Table 1).

The proposed technology based effluent limits for outfall 001 are presented in Table 1.

Table 1. Technology Based Effluent Limit for Outfall 001

Parameter	Concentration (mg/L) Daily Maximum (1)
Total Nitrogen as N	26

(1) See definitions, Part I.A of the permit

IV. Water-Quality Based Effluent Limits

A. Receiving Water

The applicant submitted ground water analytical data from wells around the proposed wastewater treatment system. All ground water quality data used in development of permit conditions comes from wells that are located within one mile of the discharge site. Ground water quality sampling was conducted from two onsite monitoring wells. The first well is the "Denton's Point 48" well" (Ground Water Information Center [GWIC] ID # 189382). The second well is the "Denton's Point 6" well" (GWIC ID # 230841). Sampling events occurred on October 11, 2007, September 28, 2007 and May 10, 2007. Ground water quality analysis for the above mentioned sampling events is listed in Table 2. Permit application materials indicate the presence of shallow ground water at approximately 8.5 feet below ground surface.

Application materials submitted to the Department on behalf of the applicant, by Professional Consultants Inc. (PCI) reported the hydraulic conductivity of the aquifer as ranging from between 75.7 ft/day to 696 ft/day. This estimate is derived from a pump test conducted on a source well on the LG site. This well was finished at a depth of 100 feet below ground surface (BGS) in limestone and was constructed with a open casing from 64 feet to 100 feet BGS. The hydraulic conductivity values submitted by PCI are representative of the limestone aquifer, not the coarse gravel alluvium to which the drainfields will be discharging. Therefore a conservative approach will be taken with regards to acceptance of a hydraulic conductivity value, and the value of 75.7 ft/day will be used. The hydraulic gradient in the shallow ground water was reported as 0.006 ft/ft, estimated from 3 onsite monitoring wells.

Table 2. Ground Water Monitoring Results for the Receiving Water

Well Identification	Date Samples	Nitrate mg/L	Nitrite mg/L	pH	Chloride mg/L	Total Dissolved Solids mg/L	Conductivity (umhos/cm)
GWIC ID # 189382	9/28/2007	0.18	ND	7.86	1	224	324
GWIC ID # 189382	5/10/2007	0.78	ND	7.69	1	221	383
GWIC ID # 230841	10/11/2007	0.17	ND	7.92	2	165	304

Sampling events (Table 2) yielded specific conductivity values of between 304 and 383 umho/cm. Therefore, the receiving water for Outfall 001 is Class I ground water as defined by the Administrative Rules of Montana [ARM 17.30.1006 (1)(a)] (ground water with specific conductance equal to or less than 1,000 microSiemens/cm). Class I ground water is to be maintained for the following beneficial uses with little or no treatment: public and private water supplies, culinary and food processing purposes, irrigation, drinking water for livestock and wildlife and for industrial and commercial uses. Water quality human health standards (DEQ-7, February 2006) apply to concentrations of substances in Class I ground waters. Pursuant to ARM 17.30.1006(1)(b)(ii) for parameters that are not listed in DEQ-7, there shall be no increase in Class I receiving water concentrations to levels that render the water harmful, detrimental or injurious to the beneficial uses listed for Class I waters. The Department may use any credible information to determine these levels. Class I ground waters are considered high quality waters and are subject to Montana's Nondegradation Policy [75-5-303, Montana Code Annotated (MCA)].

The National Resources Conservation Service (NRCS) indicates that soils in the vicinity of the wastewater treatment system are primarily Maciver Loam (0-7 inches Loam, 7-11 inches Very gravelly clay loam, 11-60 inches Very gravelly loamy) and Helmville cobbly loam (0-2 inches slightly compacted plant material, 2-10 inches cobbly loam, 10-14 inches very cobbly loam, 14-25 inches very cobbly loam, 25-60 inches very cobbly loam).

Local geology in the area beneath the proposed discharge consists of highly fractured limestone. These site specific conditions are documented in the aquifer test submitted to the Department as supplemental information from Tetra Tech, well logs submitted as part of the permit application and phone conversations with PCI staff (DEQ 2007).

Based on proximity, the nearest surface water to Outfall 001 is Georgetown Lake, approximately 433 feet north of the proposed discharge. Based on the direction of ground water flow, the nearest surface water to Outfalls 001 is Georgetown Lake, approximately 520 feet down gradient. Ground water flow direction in the vicinity of the drainfield was reported to be approximately N30°W. Groundwater flow direction of the shallow aquifer was established via data collected from monitoring wells on-site.

B. Basis for Water Quality Based Effluent Limits

ARM 17.30.506 (1) states that a discharge to state waters shall not cause a violation of a water quality standard outside a Department authorized mixing zone. Water quality limitations must be established in permits to control all pollutant or pollutant parameters that are or may be discharged at a level which will cause, have reasonable potential to cause or contribute to an excursion above any state water quality standard. The permittee must comply with the permit developed by the Department in accordance with the Montana Numeric Water Quality Standards included in Circular DEQ-7 (February 2006) and protection of beneficial uses (ARM 17.30.1006).

C. Nitrate

Class I ground water is considered high quality water and is subject to Montana's Nondegradation Policy ARM 17.30 subchapter 7. The proposed wastewater system is considered a new or increased source as pursuant to ARM 17.30.702 (18)(a). The applicable ground water standard, a nitrate concentration of 7.5 mg/L at the end of the proposed standard mixing zone is based on nondegradation rules [ARM 17.30.715 (1)(d)(iii)]. The Department assumes all the nitrogen discharged to the drainfield in the effluent is converted to nitrate as nitrogen. The allowable discharge concentration is derived from the mass balance water quality equation, which considers dilution and background concentration of the receiving water (EPA, 2000).

$$C_2 = \frac{C_3(Q_1 + Q_2) - C_1 Q_1}{Q_2}$$

C_1= ambient ground water (background) concentration, mg/L
C_2 = allowable discharge concentration, mg/*L*
C_3 = ground water concentration limit for pollutant (from Circular DEQ-7 February 2006 or other appropriate water quality standard) at the end of the mixing zone.
Q_1 = ground water volume (ft^3 / day)
Q_2 = maximum flow of discharge (design capacity of system in ft^3 / day)

The volume of ground water that will mix with the discharge (Q_s) is estimated using Darcy's equation: $Q_1 = K\ I\ A$.

Where: Q_1 = ground water flow volume (ft^3/day)
K = hydraulic conductivity (ft/day)
I = hydraulic gradient (ft/ft)
A = cross-sectional area (ft^2) of flow at the down-gradient boundary of the mixing zone.

$(Q_{1\text{-}001}) = (75.7\ ft/day)(0.006\ ft/ft)(4{,}000\ ft^2)$

$$Q_{1\text{-}001} = 1{,}817 \text{ ft}^3/\text{day}$$

The design capacity of the entire wastewater disposal system is 5,500 gpd, or 735 ft^3/day. Hydraulic conductivity (K) of the alluvium is estimated at 75.7 feet per day (ft/d). The gradient was calculated based on well data from wells surrounding the site, at 0.006 ft/ft. The area (A) is calculated by the width of the terminus of the mixing zone perpendicular to the ground water flow direction, times a depth to limiting layer (static water level) of 10 feet. The applicable water quality standard of 7.5 mg/L must be met at the end of the mixing zone. The permit application indicated a background groundwater quality Nitrate plus Nitrite concentration of 0.8 mg/L. Therefore a concentration of nitrate (as N) of 0.8 mg/L was used in calculating the allowable nitrogen concentration at the end of the mixing zone. It is assumed that the entire total nitrogen load in the seepage effluent converts to nitrate and enters the ground water.

$$C_2 = \frac{7.5 \text{ mg/L } (1{,}817 \text{ ft}^3/\text{day} + 735 \text{ ft}^3/\text{day}) - (0.8 \text{ mg/L}) (1{,}817 \text{ ft}^3/\text{day})}{(735 \text{ ft}^3/\text{day})}$$

$$= 24.05 \text{ mg/L}$$

The projected daily maximum concentration of the total nitrogen in the effluent discharged to groundwater must not exceed 24.05 mg/L at Outfall 001. The Department assumes an additional 7% nitrogen removal occurs within the drainfield providing a final total nitrogen concentration discharged to ground water of 25.7 mg/L. These effluent limits ensure the nitrate plus nitrite (as N) concentration at the end of the ground water mixing zones are at or below the nondegradation significance criterion of 7.5 mg/L.

D. Phosphorus

Phosphorus is removed mainly through soil sorption processes, which vary based on soil composition. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the average load of phosphorus from the wastewater source, between the discharge point and the closest downgradient surface water. Total phosphorus limitations are imposed to ensure that the quality of the effluent meets the nondegradation limit prior to discharge into any surface water [ARM 17.30.715(1)(e)]. Phosphorous breakthrough analysis calculations are mass based therefore the limit will be a load based discharge limit.

A phosphorous breakthrough analysis was conducted using information provided by the applicant in the most recent submittal of supplemental permit application materials (received March 12, 2008). The applicant indicated a depth to limiting layers based on a well log from the closest well to the proposed drainfield. Notes on how to conduct the phosphorous breakthrough analysis (Regensburger 2005) indicate the depth to limiting layer be based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals. The applicant submitted data on test pits dug onsite (received March 31, 2007). The average test pit depth is 10.0 feet, subtracting 2.0 feet to account for distribution lateral in the drainfield the resulting depth to limiting layer is 8.0 feet.

Using this depth to limiting layers (8.0') and the distance to the closest surface water, Georgetown Lake (approximately 430 feet north and down gradient of the proposed drainfields) the breakthrough time for phosphorus is 50.1 years. This breakthrough time is considered

nonsignificant pursuant to Montana's Nondegradation criteria [ARM 17.30.715(1)(e)]. A mixing zone will be granted for phosphorous.

A phosphorous breakthrough would occur in 50 years (the level of significant degradation) at an effluent concentration of 10 mg/ L and load of 0.46 lbs/day or 168.5 lbs/year. Therefore the effluent limit for the Total Phosphorous load discharged to the drainfield shall not exceed 0.46 lbs/day or 168.5 lbs/year for Outfall 001. The water quality based effluent limit for each outfall will therefore be set at 0.46 lb/day.

E. Escherichia Coli

An Escherichia Coli (E coli) limit has been established in this permit due to the following site-specific criteria:

- Presence of shallow groundwater onsite.
- The presence of fractured bedrock geology approximately 10 feet BGS.
- Previous groundwater quality monitoring of onsite wells has indicated the presence of E- Coli bacteria.
- The proximity of a public use area immediately down gradient of the proposed discharge
- The wastewater treatment system does not incorporate disinfection of effluent.

The proposed water quality and nondegradation effluent limits for outfall 001 are presented in Table 3.

Table 3. Water-Quality Based Effluent and Nondegradation Limits for Outfall 001

Parameter	Concentration (mg/L) Daily Maximum (1)	90 Day Average Load (2) (lbs/ per day)
Nitrogen as N	25.7	1.18
Total Phosphorus as P	10.0	0.46
Escherichia Coli	<1.0	NA

(1) See definitions, Part I.A of the permit
(2) Load calculation: lb/d = (mg/L) x flow (gpd) x 8.34 x 10^{-6}
(3) NA = Not applicable

F. Mixing Zone

The shape of the proposed mixing zone is determined from the drainfield dimensions, ground water table elevation, and groundwater flow direction. This information was submitted with the permit application and is discussed in length in Section IV. A. of this document. Ground water quality standards may be exceeded within a Department authorized mixing zone (ARM 17.30.1005), provided that all existing and future beneficial uses of state waters are protected [ARM 17.30.506 (1)].

ARM 17.30.506 states that no mixing zone will be granted if it would threaten or impair existing beneficial uses. ARM 17.30.506 (2) (g) states that when currently available data indicate that the movement of ground waster or pollutants within the subsurface cannot be accurately predicted, such as the movement of ground water through fractures, and also indicate that this

unpredictability might result in adverse impacts due to a particular concentration of a parameter in the mixing zone, it may be appropriate to deny the mixing zone for the parameter of concern.

Application materials submitted by PCI confirm the presence of highly fractured bedrock geology. Aquifer testing analysis conducted by Tetra Tech Inc. reported: "the aquifer type (fractured limestone) and the results of the short duration constant discharge aquifer test indicate a highly transmissive aquifer". The applicant submitted permit application materials including well logs for monitoring wells drilled on site. These well logs indicate limestone occurring at depths between 5 to 13 feet below ground surface (GWIC ID #'s 52341, 230841, 230842, 230870). Test pits and soil borings conducted onsite indicate soils occurring between 0-10 and 0-35 feet respectively.

Ground water flow in free flow aquifers is controlled by the orientation of the bedding planes and fractures that determine the locations of solution conduits, but not by any confining beds (Fetter 1988). The applicant did not submit information specific to the fractured bedrock geology underlying the site or information pertaining to the orientation of bedding planes and the orientation of fractures. The applicant did not submit information regarding the potential impacts of a fractured bed rock aquifer and the fate and transport of the proposed discharge. Therefore the Department will deny the proposed 430' mixing zone. The Department will grant a 330' mixing zone. The mixing zone shall not extend past the northern property boundary of the Lakeside at Georgetown property.

The permittee must comply with the ground water mixing zone rules pursuant to ARM 17.30 Subchapter 5 and all applicable ground water quality standards. Ground water standards for nitrate may be exceeded within the mixing zone provided that all existing and future beneficial uses of the state waters are protected (ARM 17.30.1005). The concentration of Nitrate (N) must not exceed 7.5 mg/l on the hydraulically down gradient boundary of the mixing zone [ARM 17.30.715(1)(d)(iii)].

The applicant submitted permit application materials that indicate the presence of drinking water wells onsite. A number of these wells are within the proposed mixing zone or have a zone of influence that intercepts a mixing zone. ARM 17.30.508 (2) states that no mixing zone for ground water will be allowed if the zone of influence of an existing drinking water supply well will intercept the mixing zone. ARM 17.30.502 (13) states that the zone of influence means the area under which a well can be expected to remove water. Therefore, issuance of the permit will be made contingent on abandonment of all wells within the mixing zone or with a zone of influence intersecting a mixing zone. All wells shall be abandoned in accordance with ARM 36.21.670-678.

V. Final Effluent Limits

The proposed final effluent limitations for Outfall 001 are summarized in Table 4 and are based on more restrictive of the technology based effluent limits and the water quality based effluent limits discussed in section IV.

Class I ground water is to be maintained for the following beneficial uses with little or no treatment: public and private water supplies, culinary and food processing purposes, irrigation,

drinking water for livestock and wildlife and for industrial and commercial uses. Water quality human health standards (DEQ-7, February 2006) apply to concentrations of substances in Class I ground waters. Pursuant to 75-5-402 (3), ARM 17.30.1031(2) and ARM 17.30.1006 (1)(a) the Department will implement limits such that the discharge from outfall 001 shall not cause increase of a parameter to a level that renders the water harmful, detrimental or injurious to the beneficial uses listed for class I water.

The permittee submitted technical information indicating a design capacity of 5,500 gpd. The design flow is the peak flow (daily or instantaneous) for sizing hydraulic facilities, such as pumps, piping, storage and adsorption systems and means the average daily flow for sizing other treatment systems. This value is used in calculations for phosphorous load limits and for calculations for determining the allowable nitrogen concentration at the end of the mixing zone. The combined flow limit from outfalls 001 shall not exceed the design capacity of 5,500 gpd based on the daily average.

Table 4. Numeric Effluent Limits for Outfall 001

Parameter	Concentration (mg/L) Daily Maximum (1)	90 Day Average Load (2) (lbs/ per day)
Nitrogen as N	25.7	1.18
Total Phosphorus as P	10.0	0.46
Escherichia Coli	<1.0	NA

(1) See definitions, Part I.A of the permit
(2) 90 day average load calculation: lb/d = (mg/L) x flow (gpd) x 8.34 x 10^{-6}
(3) NA = Not Applicable

VI. Monitoring Requirements

Effluent monitoring is essential to ensure the effective treatment and consistency of the wastewater discharged from the facility. Effluent limits are established to protect the ground water from a change in water quality that would cause degradation [ARM 17.30.715] or limit a beneficial use [ARM 17.30.1006(1)(a)]. Effluent quality samples or measurements shall be representative of the volume and nature of the monitored discharge.

The permittee shall monitor the flow of the effluent continuously and report the gallons per day based on the daily maximum. The effluent flow measurement method shall be either by flow meter and recorder or a totalizing flow meter; dose counts or pump run-times will not be accepted. Flow measurement equipment must have the ability to report a daily maximum flow.

To ensure that the Total Phosphorous load is calculated correctly, an accurate daily maximum flow must be measured. Daily maximum flow shall be measured when required sampling is conducted (flow measurement must correspond to sample collection to calculate an accurate load). The effluent flow rate is to be measured and reported as a daily maximum flow.

Effluent quality monitoring shall occur from the dosing tank prior to discharge into the drainfields. The permittee shall monitor the effluent for the constituents in Table 5 at the frequency and with the type of measurement indicated. If no discharge occurs during the entire monitoring period, it shall be stated in a Discharge Monitoring Report (DMR) that no discharge occurred.

Table 5. Outfall 001 Parameters Monitored in the Effluent Prior to Discharge to the Drainfield

Parameter	Frequency	Sample Type[1]
Effluent Flow Rate, gpd[2] [3]	Daily[1]	Continuous[1]
Biological Oxygen Demand (BOD_5), mg/L	Quarterly	Composite
Total Kjeldahl Nitrogen (TKN), mg/L	Quarterly	Composite
NO_3+NO_2 as N, mg/L	Quarterly	Composite
Nitrate as N, mg/L	Quarterly	Composite
Ammonia, as N, mg/L	Quarterly	Composite
Total Phosphorus (as P), mg/L	Quarterly	Composite
Total Suspended Solids (TSS) mg/L	Quarterly	Composite
Total Nitrogen (as N), mg/L	Quarterly	Calculated
Total Nitrogen (as N), lb/d	Quarterly	Calculated
Total Phosphorus (as P), lb/d	Quarterly	Calculated
Chloride, mg/L	Quarterly	Composite

(1) See definitions, Part I.A of the permit
(2) If no discharge occurs during the reporting period, "no discharge" shall be recorded on the DMR report form
(3) Permittee is to report the daily maximum and 90 day average

A. Ground Water Monitoring

Ground water monitoring will be required in this permit due to the following site-specific criteria:

- This area is experiencing rapid growth with high density development.
- Proximity of the water table to the surface (10-15 ft below the surface).
- The shallow aquifer is comprised of fractured bedrock geology.
- The need to distinguish the effects to ground water of the discharging wastewater treatment system.

The permittee is required to monitor the ground water on the downgradient edges of the 330-foot mixing zone. The permittee will be required to install a minimum of one monitoring well at the end of the mixing zone. This monitoring well shall be located in the centerline of the terminus of the mixing zone for outfall 001. The shape of the proposed mixing zone is determined from the drainfield dimensions, ground water table elevation, and groundwater flow direction. This information was submitted with the permit application and is discussed in length in Section IV.A. of this document. The permittee will be required to install a minimum of three monitoring points within the mixing zone to determine the extent and rate of travel of any effluent plume. Please see section VIII. B. of this document for further information regarding groundwater quality monitoring. The permittee will conduct quarterly monitoring for the parameters listed in Table 6.

Table 6. Monitoring Parameters for Monitoring Well/Points:

Parameter	Frequency	Sample Type (1)
Static Water Level (SWL) (feet below the casing top)	Quarterly	Instantaneous
Specific Conductance, µmhos/cm	Quarterly	Grab
Chloride, mg/L	Quarterly	Grab
Escherichia Coli (Organisms/100 m*l*)	Quarterly	Grab
Total Ammonia, as N, mg/L	Quarterly	Grab
NO_3+NO_2 as N, mg/L	Quarterly	Grab
Nitrate as N, mg/L	Quarterly	Grab

(1) See definitions, Part I.A of this permit

VII. Nonsignificance Determination

The Department has determined that the discharge constitutes a new or increased source and is subject to Montana Nondegradation Policy (75-5-303, MCA; M 17.30.702(16)). The Department has determined this discharge to be nonsignificant with respect to nitrogen concentrations at the end of the mixing zone. Nitrogen concentrations are predicted to be less than 7.5 mg/L (DEQ nitrate sensitivity analysis 2007). Phosphorus load limits are based on nondegradation significance criteria for 50-year break-through to surface water in accordance with ARM 17.30.715(1)(e) (DEQ phosphorous break through analysis 2007). Therefore, discharge in compliance with the limitations of this permit constitutes nonsignificant degradation.

VIII. Special Conditions/Compliance Schedules

a) Effluent Flow Measurement

To ensure that the total phosphorous load is calculated correctly, an accurate daily flow must be measured. The Department requires that samples or measurements be representative of the volume and nature of the monitored discharge. Effluent flow shall be monitored following treatment in the Advantex Textile Based Packed Bed Sand Filter and prior to discharge into the drainfield. The measurement method shall be either by recorder or a totalizing flow meter dose counts or pump run-times will not be accepted. The permittee shall monitor the flow of the effluent continuously.

b) Monitoring Well/ Monitoring Point Installation

The applicant will be required to install a minimum of one monitoring well at the end of the mixing zone. This monitoring well shall be located in the centerline of the terminus of the mixing zone for outfall 001. This well shall be located down gradient of the abandoned drainfield that serviced the campground and RV park. This well shall be screened from the top of the high water table to 15 feet below the low water table. The permittee will be required to install a minimum of three monitoring points within the mixing zone. The monitoring points shall be located in such a manor that the applicant will be able to determine the extent and rate of travel of any effluent plume generated from the proposed discharge.

Within 60 days of the effective date of the permit the permittee shall submit to the Department for approval a plan for compliance ground water monitoring well and monitoring point installation as well as a brief summary of a monitoring, sampling and analysis plan for monitoring wells and monitoring points installed onsite. The plan is to include the location, conceptual design and construction methods of the planned ground water monitoring wells/points, and the monitoring, sampling and analysis methods that will be used to meet the monitoring required in the permit.

Ground water quality monitoring shall begin within 180 day of the effective date of the permit and continue though the duration of the permit. The permittee shall submit to the Department a brief report or letter documenting the results of the monitoring well installation including the final location of the installed monitoring well/points, construction details for the well/point and a report on ground water quality in the from the well/point. Ground water quality analysis shall include those parameters listed in Table 6.

c) Abandonment of Drinking Water Wells

The applicant submitted permit application materials that indicate the presence of drinking water wells onsite. A number of these wells are within the proposed mixing zone or have a zone of influence that intercepts a mixing zone. ARM 17.30.508 (2) states that no mixing zone for ground water will be allowed if the zone of influence of an existing drinking water supply well will intercept the mixing zone. ARM 17.30.502 (13) states that the zone of influence means the area under which a well can be expected to remove water. Therefore issuance of the permit will be made contingent on abandonment of all wells within the mixing zone or with a zone of influence intersecting a mixing zone. All wells shall be abandoned in accordance with ARM 36.21.670-678. The department will issue the permit upon receipt of confirmation of well abandonment.

d) Tracer Study

If the permittee is found to be in violation of numeric effluent limits for three consecutive monitoring events, water quality standards for nitrogen, phosphorous or E-coli are exceeded at the end of the mixing zone or if excessive nutrient concentrations are documented in state waters outside of the proposed mixing zone the permittee will be required to conduct a groundwater study. The groundwater study will be conducted to determine if preferential flow paths exist in the fractured bedrock geology.

Prior to conducting this study the permittee shall submit to the Department a narrative description of the proposed activities. This includes but is not limited to project design and description of operations, test protocols and project monitoring, points of tracer injection or distribution, amounts and types of traces to be used. The permittee shall provide the Department a narrative description of the impacts that may occur if tracer solution migrates outside the test area, anticipated effects and expected concentrations. The permittee shall provide the Department description of how the project will be monitored including type, frequency and duration of tests and detailed monitoring protocols.

The permittee shall provide Material Safety Data Sheets for all tracers to be used. Under no circumstances shall the tracers contain hazardous substances.

IX. Information Source

In the development of the effluent limitations, monitoring requirements and special conditions for the draft permit, the following information sources were used to establish the basis of the draft permit and are hereby referenced:

ARM Title 17, Chapter 30, Sub-chapter 5 - Mixing Zones in Surface and Ground Water, September 1999.

ARM Title 17, Chapter 30, Sub-chapter 7 - Nondegradation of Water Quality, March 2000.

ARM Title 17, Chapter 30, Sub-chapter 10 - Montana Ground Water Pollution Control System (MGWPCS), March 2002

Environmental Protection Agency, U.S. EPA NPDES Permit Writers Manual, December 1996

Environmental Protection Agency, U.S. EPA Wastewater Technology Fact Sheet, Package Plants, EPA 832-F-00-016 September 2000.

Environmental Protection Agency, Design Manual: Onsite Wastewater Treatment System Manual. EPA 625/R-00/008, 2002.

Department of Environmental Quality, Montana Groundwater Pollution Control System Permit Application. Received May 31, 2007.

Department of Environmental Quality, Public Water Supply and Subdivisions Waiver/Deviation Request. April 3, 2008

Fetter, C.W., Applied Hydrogeology., 1988

Professional Consultants Inc. Permit Application Materials submitted to the Department Mmay 2007-November 2007

Regensburger, E. Nutrient-Reducing Wastewater Treatment System Designation Form. Montana Department of Environmental Quality. 2004

Regensburger, E. How to Perform a Nondegradation Analysis for Subsurface Wastewater Treatment Systems. Montana Department of Environmental Quality. 2005

United States Department of Agriculture, Natural Resource Conversation Service, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx .

Prepared By: Louis Volpe June 2, 2008